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Energy Supply Technical Work Group
List of Priorities for Analysis

February 22, 2006

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ES-1: Environmental Portfolio Standard (1R)

1. Policy Description:
   a. Lay description of proposed policy action:

      An environmental portfolio standard (EPS) is a requirement that utilities must supply a certain percentage of electricity from environmentally friendly sources. For example, an EPS of 5% would mean that for every 100 kWh that a utility supplies to end users, 5 kWh must be from environmentally friendly sources. An EPS differs from a Renewable Portfolio Standard (RPS) in that an EPS can include more options than renewables for meeting the requirement. For example, “negawatts” generated through verified energy efficiency projects could apply toward the EPS requirement. If a large industrial customer with a current demand of 35,000 MWh per year invests in energy efficiency that reduces demand by 20% or 7,000 MWh, and this investment and reduction are verified by an independent auditor, then the customer would have 7,000 MWh of clean energy credits to sell to a utility. Utilities can meet their requirements by purchasing or generating environmentally friendly electricity or by purchasing clean energy credits. By giving utilities the flexibility to purchase clean energy credits, a market in these credits will emerge that will provide an incentive to companies that are best able to generate clean energy, either through energy efficiency or renewables. Other options for meeting the requirement are possible depending on how the EPS is structured. For example, a provision can be included so that funding for research and development be applied toward meeting a utility’s commitment.

   b. Policy Design Parameters:
      i. Implementation level(s) beyond BAU:

         ES-1a: This is the ACC staff recommendation for changes to the EPS with SRP continuing with its proposed renewable investments:

         - 5% in 2015, 15% in 2025
         - Solar electric requirement down to 20% of EPS requirement
         - 25% of EPS requirement from distributed renewables
         - 10% of EPS requirement should come from RFP for renewable generation in 2006 and 40% in 2010
         - Increase in Environmental Portfolio Surcharge caps
         - Renewable Energy Credit (REC) trading is allowed, provided that all other associated attributes are retired when applying RECs to the Annual Renewable Energy Requirement; out-of-state

resources can be used provided that the necessary transmission rights are obtained and utilized.

ES-1b: This is Western Resource Associates' proposal with SRP continuing with its proposed renewable investments:

- 1% in 2005, increasing 1% each year to 26% in 2025
- 8% of portfolio is solar electric (2005 - 2012), then 10% in 2012 up to 20% in 2023
- Retain extra credit multiplier
- Allow out-of-state renewables and REC trading

ES-1c: This is Western Resource Associates' proposal with SRP meeting the same requirement.

ES-1d: A different EPS approach?

ii. Timing of implementation:

Noted above.

iii. Implementing parties:

ES-1a and **ES-1b**: Utilities regulated by the ACC.

ES-1c: All Arizona utilities.

ES-1d: Depends on approach.

iv. Other

The volunteer group suggested that we use a least-cost approach, subject to resource availability constraints, to determine which renewable energy resources and technologies would be used to meet the EPS beyond the specific requirements laid out in the proposals.

c. Implementation Mechanism(s): Indicate which mechanisms are to be used, and describe the specific approach that is proposed

i. An EPS is usually implemented through a regulatory requirement on the applicable utilities.

2. BAU Policies/Programs, if applicable:

a. In the existing EPS, utilities (not including SRP) must generate a specified percentage of their total retail sales from renewable energy:

- Started in 2001 at 0.2% and increased annually to 1% in 2005 and will increase to 1.1% in 2007. Expires in 2012

- 2001–2003: 50% of current EPS requirement must be solar electric; remainder can be other environmentally friendly technologies including no more than 10% R&D
- 2004–2012: 60% of resources must be solar electric
- Environmental Portfolio Surcharge of $0.000875 per kWh with caps by customer class.

3. Types(s) of GHG Benefit(s):
   a. CO2: By creating a substantial market in renewable generation, an EPS can reduce fossil fuel use in power generation, and correspondingly reducing CO2 emissions
   b. CH4
   c. N2O
   d. HFC's, SFC's
   e. Black Carbon: To the extent that generation from coal and oil is displaced by renewables, black carbon emissions will decrease.

4. Types of Ancillary Benefits and or Costs, if applicable:
   a. Reductions in overall energy consumption and the shift from fossil fuel generation as a result of an EPS will lead to reductions in criteria air pollutants and, consequently, lower health impacts and costs associated with those pollutants.
   b. While much of the EPS requirement will come from low-cost renewables such as wind and biomass, meeting the requirement will lead to a moderate increase in direct costs to utilities implementing the EPS policy and a small increase in overall electricity system cost for Arizona. At the same time, investment in new technologies resulting from the EPS will spur economic development and corresponding job growth.

5. Estimated GHG Savings and Costs Per MMTCO2e:
   a. Summary Table of:
      i. GHG potential in 2010, 2020
      ii. Net Cost per MMTCO$_2$e in 2010, 2020
   b. Insert Excel Worksheet showing summary GHG reduction potential and net cost

6. Data Sources, Methods and Assumptions:
    a. Data Sources
    b. Quantification Methods
    c. Key Assumptions

7. Key Uncertainties if applicable:
    a. Benefits
    b. Costs

8. Description of Ancillary Benefits and Costs, if applicable:
    a. Description of issue #1
    b. Description of issue #2
    c. Etc.

9. Description of Feasibility Issues, if applicable:
    a. Description of issue #1
    b. Description of issue #2
    c. Etc.

10. Status of Group Approval:
    a. Pending
    b. Completed

11. Level of Group Support:
    a. Unanimous Consent
    b. Supermajority
    c. Majority
    d. Minority

12. Barriers to consensus, if applicable (less than unanimous consent):
    a. Description of barrier #1
    b. Description of barrier #2
    c. Etc.

ES-2: Public Benefit Fund (2R)

1. Policy Description:

   a. Lay description of proposed policy action:

      A public benefit fund (PBF) is a state fund dedicated to support energy efficiency (EE) and renewable energy (RE). To date, nineteen states have implemented PBF programs. A small charge rate, typically in the 2 to 5 mils per kWh range, is applied to electricity sales in the state and collected by a PBF manager. Funds are typically used to support EE and RE in a number of ways, such as through public education, R&D, demonstration projects, direct grants/buy-downs/tax credits to subsidize advanced technologies, and low interest revolving loans. Funding goes to the residential, commercial and industrial sectors. Fund managers decide which technologies to support based on criteria such as GHG reduction potential, cost-effectiveness, co-benefits, etc.

   b. Policy Design Parameters:

      i. Implementation level(s) beyond BAU:

         Introduce a per-kiloWatt-hour charge and apply the proceeds as described above.

         If, for instance, Arizona charged rate of 2 mils per kWh in 2007 & 2008, 3 mils per kWh in 2009-2011, 4 mils per kWh in 2012-2015, and 5 mils per kWh from 2016 on, then approximate fund totals based projected electricity sales in Arizona would be:

	2007	2010	2013	2016	2019	2022	2025
Fund totals (million)	$145	$239	$351	$483	$532	$587	$648

The volunteer group suggested that we assume a flat 4 mils per kWh charge for the PBF scenario.

Share of total funding as follows:

- Direct grants/buy-downs/tax credits: 60%
- Low interest revolving loans: 15%
- R&D: 10%
- Demonstration projects: 10%
- Public education: 5%

Ed Fox of APS suggested that we model the breakdown of PBF funding on the APS Demand-Side Management proposal now before the Arizona Corporation Commission. Once we receive this information, we will fill in the following sections for the TWG to consider.

Direct grants/buydowns/tax credits funded:

Residential (___%): Lighting (___%), space heating/cooling/weatherization (___%), refrigeration (___%), renewables (___%)

Commercial (___%): Lighting (___%), space heating/cooling/weatherization (___%), refrigeration (___%), renewables (___%), fuel cells (___%)

Industrial (___%): Lighting (___%), space heating/cooling/weatherization (___%), motors (___%), processes (___%), fuel cells (___%)

Low interest loans (focus on commercial and industrial):

Space heating/cooling/weatherization (___%), refrigeration (___%), CHP (___%), motors (___%), industrial processes (___%)

R&D funded:

Lighting (___%), space heating/cooling/weatherization (___%), refrigeration, solar (___%), wind (___%), CHP (___%), motors (10%), industrial processes (___%)

Demonstration projects:

?

ii. Timing of implementation:

See above.

iii. Implementing parties:

Public Benefit Fund Manager created by legislature. Utilities will collect the charges from customers and transfer to the Fund Manager. Fund Manager will distribute money to be implemented at the residential, commercial and industrial levels.

iv. Other

c. Implementation Mechanism(s): Indicate which mechanisms are to be used, and describe the specific approach that is proposed

i. Funding mechanisms and or incentives

ii. Pilots and demos

iii. Research and development

iv. Education

2. BAU Policies/Programs, if applicable:

   a. No PBF is in place in Arizona

3. Types(s) of GHG Benefit(s):

   a. CO2: By spurring investment in energy efficient technologies and small-scale renewable generators, PBF programs reduce the need for generation from fossil fuel plants, which can lead to a significant reduction in GHG emissions.

   b. CH4

   c. N2O

   d. HFC's, SFC's

   e. Black Carbon: To the extent that generation from coal and oil is displaced by energy efficiency and renewables, black carbon emissions will decrease.

4. Types of Ancillary Benefits and or Costs, if applicable:

   a. Reductions in overall energy consumption and the shift from fossil fuel generation as a result of a PBF will lead to reductions in criteria air pollutants and, consequently, health impacts and costs associated with those pollutants.

   b. Much of the investment made by the PBF will go into zero- or low-cost (even negative cost) energy efficiency and small-scale renewables, and the PBF program can more than pay for itself through cost-effective investments. Nevertheless, the impact on the larger electricity system of the PBF program can lead to a small increase in overall electricity system cost. At the same time, though, investment in new technologies resulting from the PBF will spur economic development in Arizona.

5. Estimated GHG Savings and Costs Per MMTCO2e:

   a. Summary Table of:

      v. GHG potential in 2010, 2020

      vi. Net Cost per MMTCO_2e in 2010, 2020

   b. [Insert Excel Worksheet showing summary GHG reduction potential and net cost]

6. Data Sources, Methods and Assumptions:

   a. Data Sources

   b. Quantification Methods
   c. Key Assumptions

7. Key Uncertainties if applicable:
   a. Benefits
   b. Costs

8. Description of Ancillary Benefits and Costs, if applicable:
   a. Description of issue #1
   b. Description of issue #2
   c. Etc.

9. Description of Feasibility Issues, if applicable:
   a. Description of issue #1
   b. Description of issue #2
   c. Etc.

10. Status of Group Approval:
    a. Pending
    b. Completed

11. Level of Group Support:
    a. Unanimous Consent
    b. Supermajority
    c. Majority
    d. Minority

12. Barriers to consensus, if applicable (less than unanimous consent):
    a. Description of barrier #1
    b. Description of barrier #2
    c. Etc.

ES-3: Direct Renewable Energy Support (3R)

1. Policy Description:

   a. Lay description of proposed policy action:

      Direct renewable energy support can take many forms including tax credits and incentives, R&D and siting/zoning. The purpose of this suite of policies is to encourage investment in renewables now by providing a direct financial incentive and by removing barriers to siting and zoning renewable energy facilities. Development of new renewable technologies is also encouraged by funding R&D.

      Incentives can take many forms: (1) direct subsidies for purchasing/selling renewable technologies given to the buyer/seller; (2) tax credits or exemptions for purchasing/selling renewable technologies given to the buyer/seller; (3) tax credits or exemptions for operating renewable energy facilities; (4) feed-in tariff, which is a direct payment to renewable generators for each kWh of electricity generated from a qualifying renewable facility; (5) tax credits for each kWh generated from a qualifying renewable facility.

      R&D funding can be targeted toward a particular technology or group of technologies as part of a state program with a mission to build an industry around that technology in the state as well as to set the stage for adoption of the technology for use in the state. R&D funding can also be available to any renewable or other advanced technology through an open bidding procedure (driven by bids received rather than by a focused strategy to develop a particular technology). Funding can also be given for demonstration projects to help commercialize technologies that have already been developed but are not in widespread use.

      Many renewable energy technologies, particularly wind, face siting and zoning obstacles. Often the best resources are in scenic areas that spur opposition to renewable development. At the same time, the best resources may not be near existing transmission lines. Policies can be developed to help overcome these barriers.

   b. Policy Design Parameters:

      i. Implementation level(s) beyond BAU:

         The volunteer group wanted us to look at what is being done for buy-down programs and thought a good starting point was the APS buy-down program now before the ACC, as well as the statewide buy-down program the ACC is considering. The APS buy-down program has the following characteristics:

PV Systems

- Grid Tied: $3/watt DC
- Off-Grid: $2/watt DC

Solar Water Heating

- $0.50 per first year kwh savings based on OG-300 rating (for systems up to 10,000 kwh/yr)
- $0.07 per kwh equivalent (3412 BTU = 1 kwh) based on metered production for a maximum of 10 years or 50% of project cost including financing.

Solar HVAC

- $0.16 per kwh equivalent (3412 BTU = 1 kwh) based on metered production for a maximum of 10 years or 50% of project cost including financing.

We could assume support for other technologies and additional programs beyond buy-downs. Ultimately, we need to make an assumption about adoption levels that will result from direct renewable energy support. Limited appropriations for new federal subsidies in the Energy Bill may also impact this policy option and should be factored in Arizona's policy planning once appropriations have been made.

Direct subsidies: Between 20__ and 20__, ___% of capital cost for all solar and wind systems 500 kW or less. ___% of capital cost for all biomass facilities 500 kW or less. From 20__ to 20__, ___% of capital cost for all solar and wind systems 500 kW or less. ___% of capital cost for all biomass facilities 500 kW or less.

Feed-in tariffs: Starting in 20__, payment of ___ cents/kWh, in addition to the wholesale market price of generation, to all (new?) grid-connected solar (PV and thermal), wind, biomass, and geothermal systems greater than 500 kW. Generation from qualifying renewable facilities will be sold to local utilities that are required to pay the wholesale market price plus the feed-in tariff. The added cost to utilities can be recovered through utility rates. Utilities can limit the total renewable generation purchased to ___% of total sales on a first come first served basis for renewable generators. The payment of ___ cents/kWh will continue to 20__ when it will drop to ___ cents/kWh. Starting in 20__, the payment will drop to ___ cents/kWh. In 20___, the payment will drop again to ___ cent/kWh and will cease in 20__.

R&D funding: ?

ii. Timing of implementation:

See above.

iii. Implementing parties:

A state agency would administer the direct subsidies, and individuals, commercial enterprises, industrial enterprises would receive them. Utilities would administer the feed-in tariff under supervision of a state agency, and independent power producers operating qualifying renewable facilities would receive the payments. A state agency would administer R&D funding through a public-private partnership with companies and research institutions. Note that a source of funds to cover subsidies or other support would have to be determined.

iv. Other

c. Implementation Mechanism(s): Indicate which mechanisms are to be used, and describe the specific approach that is proposed

i. Funding mechanisms and or incentives

ii. Pilots and demos

iii. Research and development

2. <u>BAU Policies/Programs, if applicable:</u>

a. Personal income tax credit for renewables amounting to 25% of the cost of installation with a maximum of $1,000.

b. Sales tax exemption for up to $5,000 of the cost of a renewable installation.

3. <u>Types(s) of GHG Benefit(s):</u>

a. CO2: By providing a financial incentive for renewable generation and helping overcome siting and zoning barriers facing renewables, more renewable facilities will be installed and more electricity from renewables will be generated. This zero carbon generation will displace generation from fossil fuels and lower carbon emissions. By funding R&D, new or improved renewable technologies will be developed or commercialized, leading to even more installation of renewables and resulting reduction in carbon emissions in the long term.

b. CH4

c. N2O

d. HFC's, SFC's

e. Black Carbon: To the extent that generation from coal and oil is displaced by renewables, black carbon emissions will decrease.

4. Types of Ancillary Benefits and or Costs, if applicable:
    a. Reductions in overall electricity consumption and the shift from fossil fuel generation as a result of new renewables will lead to reductions in criteria air pollutants and, consequently, health costs associated with those pollutants.
    b. Renewable resources are less risky than fossil resources because they are not subject to unexpected changes in the price of fossil fuels due to market manipulation, disruptions in supply, and supply depletion.
    c. The operating costs of renewable generation, primarily maintenance, are spent locally and are a direct boost to local and state economies, whereas the primary cost of operating fossil fuel plants – fossil fuels – often goes out of state and does not contribute to the local or state economy.

5. Estimated GHG Savings and Costs Per MMTCO2e:
    a. Summary Table of:
        i. GHG potential in 2010, 2020
        ii. Net Cost per MMTCO$_2$e in 2010, 2020
    b. [Insert Excel Worksheet showing summary GHG reduction potential and net cost]

6. Data Sources, Methods and Assumptions:
    a. Data Sources
    b. Quantification Methods
    c. Key Assumptions

7. Key Uncertainties if applicable:
    a. Benefits
    b. Costs

8. Description of Ancillary Benefits and Costs, if applicable:
    a. Description of issue #1
    b. Description of issue #2
    c. Etc.

9. Description of Feasibility Issues, if applicable:
    a. Description of issue #1
    b. Description of issue #2
    c. Etc.

10. Status of Group Approval:
    a. Pending
    b. Completed

11. Level of Group Support:
    a. Unanimous Consent
    b. Supermajority
    c. Majority
    d. Minority

12. Barriers to consensus, if applicable (less than unanimous consent):
    a. Description of barrier #1
    b. Description of barrier #2
    c. Etc.

ES-4: Cap & Trade System (1E)

1. Policy Description:

   a. Lay description of proposed policy action:

   A cap and trade system is a market mechanism in which CO2 emissions are limited or capped at a specified level, and those participating in the system can trade permits (a permit is an allowance to emit one ton of CO2) in order to lower costs of compliance. For every ton of CO2 released, an emitter must hold a permit. Therefore, the number of permits issued or allocated is, in effect, the cap. The government can give permits away for free (according to any one of many different criteria to those participating in the cap & trade system or even to those who are not), auction them, or a combination of the two. Participants can range from a small group within a single sector to the entire economy and can be implemented upstream (at the fuel extraction and import level) or downstream at points of fuel consumption.

   b. Policy Design Parameters:

   i. Implementation level(s) beyond BAU:

   The volunteer group suggested that the TWG recommend exploring only a national GHG cap & trade program and that we examine existing studies to infer what impact a national program might have in Arizona.

   ES-4a: Several Western states (*specific states to be identified with input volunteer group*) implement a regional power sector cap and trade system that begins in 20__ with a cap equal to year 2000 emissions. By 20__, the cap will be equal to ___% below 2000 emissions. By 20__, the cap will be equal to ___% below 2000 emissions. By 20__, the cap will be equal to ___% below 2000 emissions.

   ES-4b: A national power sector cap and trade system is implemented that begins in 20__ with a cap equal to year 2000 emissions. By 20__, the cap will be equal to ___% below 2000 emissions. By 20__, the cap will be equal to ___% below 2000 emissions. By 20__, the cap will be equal to ___% below 2000 emissions.

   Other issues to consider:

   - Applicability (sources & sectors included)
   - Gases included
   - Permit allocation rules (method; options for new market entrants)
   - Generation-based or load-based; leakage concerns

- Linkage to other trading systems
- Banking and borrowing; early reduction credit
- Inclusion of emission offsets (within or outside sector, geography)
- Incentive opportunities (e.g., interaction with other pollution regulations like PA's EDGE program)

ii. Timing of implementation:

See above.

iii. Implementing parties:

Companies

iv. Other

c. Implementation Mechanism(s): Indicate which mechanisms are to be used, and describe the specific approach that is proposed

i. Market-based mechanisms with underlying regulatory obligation.

2. BAU Policies/Programs, if applicable:

a. No cap & trade system is in place in Arizona.

3. Types(s) of GHG Benefit(s):

a. CO2: A cap & trade system is a direct limit on CO2 emissions. Reductions are determined by the level of the cap.

b. CH4

c. N2O

d. HFC's, SFC's

e. Black Carbon: To the extent that generation from coal and oil declines under a cap and trade system, black carbon emissions will also decrease.

4. Types of Ancillary Benefits and or Costs, if applicable:

a. The shift from fossil fuel generation as a result of a cap and trade system will lead to reductions in criteria air pollutants and, consequently, health impacts and costs associated with those pollutants.

b. Allowing "offsets" from outside the capped sector can create the incentive to quantify and reduce GHG emissions from sources in other sectors.

c. The volunteer group pointed out that there may be ancillary costs and/or unintended consequences to a cap & trade system, including increased cost of electricity to consumers or a shift to natural gas generation that may not be feasible with the current infrastructure.

5. Estimated GHG Savings and Costs Per MMTCO2e:
    a. Summary Table of:
        i. GHG potential in 2010, 2020
        ii. Net Cost per MMTCO$_2$e in 2010, 2020
    b. Insert Excel Worksheet showing summary GHG reduction potential and net cost

6. Data Sources, Methods and Assumptions:
    a. Data Sources
    b. Quantification Methods
    c. Key Assumptions

7. Key Uncertainties if applicable:
    a. Benefits
    b. Costs

8. Description of Ancillary Benefits and Costs, if applicable:
    a. Description of issue #1
    b. Description issue #2
    c. Etc.

9. Description of Feasibility Issues, if applicable:
    a. Description of issue #1
    b. Description of issue #2

10. Status of Group Approval:
    a. Pending
    b. Completed

11. Level of Group Support:

a. Unanimous Consent
b. Supermajority
c. Majority
d. Minority

12. Barriers to consensus, if applicable (less than unanimous consent):
    a. Description of barrier #1
    b. Description of barrier #2
    c. Etc.

ES-5: Generation Performance Standard (2E)

1. Policy Description:

   a. Lay description of proposed policy action:

      A generation performance standard (GPS) can be a fixed standard that requires electricity utilities or load serving entities (LSE) to sell electricity with an average emission rate below the generation portfolio standard. For example, if the GPS were set at 1100 pounds per MWh, then each utility's generation mix must not exceed 1100 pounds per MWh. Utilities must take action to ensure that their mix meets the standard.

      A variation of a GPS is to incorporate the standard within a cap and trade system in which permits are allocated by dividing the total cap by the total number of MWhs generated to arrive at the performance standard. Permits are given to each participant based on its own generation multiplied by the performance standard. For example, if a cap on CO2 emissions were set at 10 million tons and the total generation from all plants covered under the cap equaled 4.79 million megawatt-hours in a particular year, the GPS would equal 0.479 tons CO2 per megawatt-hour generated. Generators with emission rates lower than the GPS receive more allowances than needed. Generators with emission rates higher than the GPS receive fewer allowances than needed. Under a cap & trade, the GPS would typically be updated annually based on the original formula, and permits reallocated. As electricity generation increases, everything else being equal, the number of permits per MWh would decline because of the cap.

      A third variation of a GPS is to establish the standard and allocate allowances based on that standard every year without an automatically updating standard. The standard can be ratcheted down, but will not be based on a formula as in variation two above. As new capacity comes on-line, those plants would receive an allocation. As electricity generation grows, all plants will receive more permits. Utilities could trade permits in order to achieve the standard, but there would be no fixed cap on emissions. This variation provides a financial incentive for generators to reduce emissions so that their supply mix is below the standard, and the financial incentive is provided, in effect, by generators who have high emissions – they must purchase permits from generators with low emissions.

   b. Policy Design Parameters:

      i. Implementation level(s) beyond BAU:

The volunteer group suggested that the GPS be applied only to new generation and that the GPS level should be equivalent to a new natural gas combined cycle plant. The volunteer group also pointed out that new transmission capacity into Arizona is being considered and that new electricity demand in Arizona could be served, at least in part, by out-of-state generators. Accordingly, analysis of this option should consider what effect new electricity imports into Arizona could have on a GPS policy, and how might a GPS policy affect decisions to build new capacity in or out of Arizona.

In 20__, Arizona implements a GPS of ___ pounds per MWh coupled with a tradable permit system but no fixed cap on emissions (the third variation listed above). In 20__, the GPS declines to ___ pounds per MWh. In 20__, the GPS declines to ___ pounds per MWh.

ii. Timing of implementation:

See above.

iii. Implementing parties:

Utilities

iv. Other

c. Implementation Mechanism(s): Indicate which mechanisms are to be used, and describe the specific approach that is proposed

i. Market based mechanisms with underlying regulatory obligation

2. BAU Policies/Programs, if applicable:

a. No cap & trade system is in place in Arizona.

3. Types(s) of GHG Benefit(s):

a. CO2: A cap & trade system is a direct limit on CO2 emissions. Reductions are determined by the level of the cap.

b. CH4

c. N2O

d. HFC's, SFC's

e. Black Carbon: To the extent that generation from coal and oil declines under a cap and trade system, black carbon emissions will also decrease.

4. Types of Ancillary Benefits and or Costs, if applicable:

a. The shift from fossil fuel generation as a result of a cap and trade system will lead to reductions in criteria air pollutants and, consequently, health impacts and costs associated with those pollutants.

5. <u>Estimated GHG Savings and Costs Per MMTCO2e:</u>
   a. Summary Table of:
      i. GHG potential in 2010, 2020
      ii. Net Cost per $MMTCO_2e$ in 2010, 2020
   b. Insert Excel Worksheet showing summary GHG reduction potential and net cost

6. <u>Data Sources, Methods and Assumptions:</u>
   a. Data Sources
   b. Quantification Methods
   c. Key Assumptions

7. <u>Key Uncertainties if applicable:</u>
   a. Benefits
   b. Costs

8. <u>Description of Ancillary Benefits and Costs, if applicable:</u>
   a. Description of issue #1
   b. Description issue #2
   c. Etc.

9. <u>Description of Feasibility Issues, if applicable:</u>
   a. Description of issue #1
   b. Description of issue #2

10. <u>Status of Group Approval:</u>
   a. Pending
   b. Completed

11. <u>Level of Group Support:</u>
   a. Unanimous Consent

b. Supermajority
c. Majority
d. Minority

12. Barriers to consensus, if applicable (less than unanimous consent):
    a. Description of barrier #1
    b. Description of barrier #2
    c. Etc.

ES-6: Carbon Intensity Targets (3E)

1. Policy Description:

   a. Lay description of proposed policy action:

      The volunteer group recommended that the ES TWG reconsider including this policy option. If a carbon intensity target is purely voluntary, then it falls under voluntary targets, which is a separate policy option under consideration (ES-7). Alternatively, if a carbon intensity target is mandatory, then it would probably be implemented akin to a GPS (ES-5) or converted to a cap, likely with trading allowed (ES-4). The volunteer group also felt that carbon intensity targets – however implemented – were more appropriate as economy-wide measures rather than electricity-sector-only targets and would thus need consideration by a broader array of TWG stakeholders.

      Rather than a fixed cap on carbon emissions, a carbon intensity target is a limit on the ratio of carbon emissions to a measure of output. Absolute emissions can increase as output increases. Measures of output are clear for some sectors like electricity generation (e.g., MWh), and more difficult for other sectors (e.g., manufacturing). One measure of output for other sectors could be dollars equal to the value of output.

   b. Policy Design Parameters:

      i. Implementation level(s) beyond BAU:

         Arizona implements a mandatory carbon intensity target that begins in 20__ (equal to carbon intensity in 20__) and that declines by ___% annually through 20__. The carbon intensity target is translated annually into a cap and trading is allowed under that cap.

      ii. Timing of implementation:

         See above.

      iii. Implementing parties:

         Companies

      iv. Other

   c. Implementation Mechanism(s): Indicate which mechanisms are to be used, and describe the specific approach that is proposed

      i. Market based mechanism with underlying regulatory obligation.

2. BAU Policies/Programs, if applicable:
    a. No carbon intensity target is in place in Arizona.

3. Types(s) of GHG Benefit(s):
    a. CO2: A carbon intensity target may or may not reduce CO2 emissions. A stringent intensity target is more likely to lead to reductions than a lenient target. A less stringent target may curb growth in emissions, but not reduce emissions.
    b. CH4
    c. N2O
    d. HFC's, SFC's
    e. Black Carbon: To the extent that generation from coal and oil declines under a carbon intensity target, black carbon emissions will also decrease.

4. Types of Ancillary Benefits and or Costs, if applicable:
    a. The shift from fossil fuel generation as a result of a carbon intensity target will lead to reductions in criteria air pollutants and, consequently, health impacts and costs associated with those pollutants.

5. Estimated GHG Savings and Costs Per MMTCO2e:
    a. Summary Table of:
        i. GHG potential in 2010, 2020
        ii. Net Cost per $MMTCO_2e$ in 2010, 2020
    b. Insert Excel Worksheet showing summary GHG reduction potential and net cost

6. Data Sources, Methods and Assumptions:
    a. Data Sources
    b. Quantification Methods
    c. Key Assumptions

7. Key Uncertainties if applicable:
    a. Benefits
    b. Costs

8. Description of Ancillary Benefits and Costs, if applicable:
    a. Description of issue #1
    b. Description of issue #2
    c. Etc.

9. Description of Feasibility Issues, if applicable:
    a. Description of issue #1
    b. Description of issue #2
    c. Etc.

10. Status of Group Approval:
    a. Pending
    b. Completed

11. Level of Group Support:
    a. Unanimous Consent
    b. Supermajority
    c. Majority
    d. Minority

12. Barriers to consensus, if applicable (less than unanimous consent):
    a. Description of barrier #1
    b. Description of barrier #2
    c. Etc.

ES-7: Voluntary CO_2 Targets and/or Trading (4E)

1. Policy Description:

   a. Lay description of proposed policy action:

      Voluntary targets can take a number of different forms. A target can be voluntarily undertaken by a company outside the context of a government program for voluntary reduction and not be legally binding. US companies are free to take on such voluntary CO_2 reduction targets, and a number of them have done so. The Chicago Climate Exchange (CCX) is an example of a trading exchange driven by voluntary participants making and selling reductions.

      A target could also be negotiated with the government through a program for voluntary reductions. The government might offer certain incentives, and companies voluntarily agree to reduction targets in exchange for receiving those incentives. Such agreements can be legally binding or not. Trading can be a component of any of these voluntary target variations. The most active trading, however, is likely to result with a negotiated but binding agreement.

      Monitoring, reporting and verification systems need to be in place to ensure that reductions are actually being made, as this kind of system would not involve allocated permits. If a company reduces beyond its target, and these reductions are verified independently, then it can sell those excess reductions to other companies that are having difficulty meeting the target. Under a mandatory cap and trade system, companies must hold an allowance for every ton emitted, but companies have no direct reduction targets. Under a voluntary but binding trading system, companies would have specific targets and would have to meet them by making reductions themselves or holding enough reduction credits, but they would not be required to hold allowances for every ton of emissions they generate. If targets are not binding, however, companies may or may not meet their reduction targets, and reduction credits may not be worth as much as they would be under a binding system.

   b. Policy Design Parameters:

      i. Implementation level(s) beyond BAU:

         The volunteer group was comfortable with a voluntary but binding approach, but suggested that the number of reduction "steps" over time be fewer than in the straw proposal. For example, emissions would freeze by a certain date, then perhaps ten years later, emissions would again be reduced. The volunteer group thought that the EPA Power

Partners Initiative might be a possible model for organizing and obtaining the negotiated agreements.

The TWG still needs to make an assumption about the level of reduction likely under a voluntary approach.

Arizona implements a state program to secure voluntary but binding negotiated agreements with power companies to freeze emissions in 20__; reduce emissions by __% in 20__; reduce by __% in 20__; and by ___% in 20__. The state will offer a number of financial incentives to achieve agreements.

ii. Timing of implementation:

See above.

iii. Implementing parties:

Companies

iv. Other

c. Implementation Mechanism(s): Indicate which mechanisms are to be used, and describe the specific approach that is proposed

i. Voluntary and or negotiated agreements

ii. Market-based mechanisms

2. <u>BAU Policies/Programs, if applicable:</u>

a. Companies are free to take on voluntary non-binding reduction targets. No companies have done so. There are no programs in place to secure any voluntary but binding negotiated agreements to reduce emissions.

3. <u>Types(s) of GHG Benefit(s):</u>

a. CO2: Non-binding voluntary reductions may or may not result in a direct reduction in CO2 emissions. Binding reductions would result in a direct limit on CO2 emissions. Reductions are determined either by the company or through a negotiation between the company and the state.

b. CH4

c. N2O

d. HFC’s, SFC’s

e. Black Carbon: To the extent that generation from coal and oil declines under voluntary reduction targets, black carbon emissions will also decrease.

4. Types of Ancillary Benefits and or Costs, if applicable:
    a. The shift from fossil fuel generation that may result from voluntary targets would lead to reductions in criteria air pollutants and, consequently, health impacts and costs associated with those pollutants.

5. Estimated GHG Savings and Costs Per MMTCO2e:
    a. Summary Table of:
        i. GHG potential in 2010, 2020
        ii. Net Cost per $MMTCO_2e$ in 2010, 2020
    b. Insert Excel Worksheet showing summary GHG reduction potential and net cost

6. Data Sources, Methods and Assumptions:
    a. Data Sources
    b. Quantification Methods
    c. Key Assumptions

7. Key Uncertainties if applicable:
    a. Benefits
    b. Costs

8. Description of Ancillary Benefits and Costs, if applicable:
    a. Description of issue #1
    b. Description issue #2
    c. Etc.

9. Description of Feasibility Issues, if applicable:
    a. Description of issue #1
    b. Description of issue #2
    c. Etc.

10. Status of Group Approval:
    a. Pending
    b. Completed

11. Level of Group Support:
    a. Unanimous Consent
    b. Supermajority
    c. Majority
    d. Minority

12. Barriers to consensus, if applicable (less than unanimous consent):
    a. Description of barrier #1
    b. Description of barrier #2
    c. Etc.

ES-8: CO2 Tax (5E)

1. Policy Description:

   a. Lay description of proposed policy action:

      A CO_2 tax is a tax on every ton of CO_2 emitted. Companies would either pass the cost on to consumers or would change production to lower emissions or a combination of the two. Either way, consumers would see the implicit cost of CO_2 emissions in products and services and would adjust behavior to purchase substitute goods and services that result in lower CO_2 emissions. Typically, a CO_2 tax is put in place with an income tax reduction to offset the economic impact of the new tax. CO_2 tax revenue could go completely to income tax reductions or part of it could go toward policies and programs to assist with CO_2 reductions.

   b. Policy Design Parameters:

      i. Implementation level(s) beyond BAU:

         The volunteer group suggested analyzing a flat $5 per ton CO_2 tax without any increases over time. The group also cautioned that a CO_2 tax would be best levied economy-wide and that an electricity-sector-only analysis is too limited.

         Arizona implements a state CO_2 tax in 20__ of $___ per ton CO_2. In 20__, the tax increases to $___ per ton. In 20__, it increases to $___ per ton. In 20__, it increases to $___ per ton. One quarter of the tax revenue will be directed to programs to reduce CO_2 emissions in the state. The remainder will be recycled through personal income tax reductions.

      ii. Timing of implementation:

         See above.

      iii. Implementing parties:

         Companies

      iv. Other

   c. Implementation Mechanism(s): Indicate which mechanisms are to be used, and describe the specific approach that is proposed

      i. Market-based (economic) mechanism with underlying legal obligation.

2. <u>BAU Policies/Programs, if applicable:</u>
    a. No CO2 tax is in place in Arizona.

3. <u>Types(s) of GHG Benefit(s):</u>
    a. CO2: A CO2 tax is a disincentive to emit CO2 emissions. Producers and consumers will adjust behavior to avoid the tax and thereby reduce CO2 emissions in the process.
    b. CH4
    c. N2O
    d. HFC's, SFC's
    e. Black Carbon: To the extent that generation from coal and oil declines under a CO2 tax, black carbon emissions will also decrease.

4. <u>Types of Ancillary Benefits and or Costs, if applicable:</u>
    a. The shift from fossil fuel generation that would result from a CO2 tax would lead to reductions in criteria air pollutants and, consequently, health impacts and costs associated with those pollutants.
    b. Shifting from a regressive income tax to a CO2 tax could have economic benefits by encouraging productive activity and discouraging harmful emissions.

5. <u>Estimated GHG Savings and Costs Per MMTCO2e:</u>
    a. Summary Table of:
        i. GHG potential in 2010, 2020
        ii. Net Cost per $MMTCO_2e$ in 2010, 2020
    b. Insert Excel Worksheet showing summary GHG reduction potential and net cost

6. <u>Data Sources, Methods and Assumptions:</u>
    a. Data Sources
    b. Quantification Methods
    c. Key Assumptions

7. <u>Key Uncertainties if applicable:</u>
    a. Benefits
    b. Costs

8. Description of Ancillary Benefits and Costs, if applicable:
    a. Description of issue #1
    b. Description of issue #2
    c. Etc.

9. Description of Feasibility Issues, if applicable:
    a. Description of issue #1
    b. Description of issue #2
    c. Etc.

10. Status of Group Approval:
    a. Pending
    b. Completed

11. Level of Group Support:
    a. Unanimous Consent
    b. Supermajority
    c. Majority
    d. Minority

12. Barriers to consensus, if applicable (less than unanimous consent):
    a. Description of barrier #1
    b. Description of barrier #2
    c. Etc.

ES-9: Barriers to Renewables and Clean DG (1G)

1. Policy Description:

   a. Lay description of proposed policy action:

      There are many barriers to renewables and clean DG, including (the following is largely from Union of Concerned Scientists website http://www.ucsusa.org/clean_energy/renewable_energy_basics/barriers-to-renewable-energy-technologies.html):

      - Commercialization barriers faced by new technologies competing with mature technologies, including infrastructure (permitting, marketing, installation, operation and maintenance), and economies of scale
      - Price distortions from existing subsidies and unequal tax burdens between renewables and other energy sources
      - Failure of the market to value the public benefits of renewables (free riders get benefits of renewables without paying for them), including reduced pollution, employment, fuel diversity and security, price stability, R&D.
      - Failure of the market to value the social cost of fossil fuel technologies (free riders use fossil fuels while everyone pays the social cost), including damages to human health, security, ecosystems and the climate.
      - Market barriers such as inadequate information, institutional barriers, high transaction costs because of small projects, high financing costs because of lender unfamiliarity and perceived risk, "split incentives" between building owners and tenants, and transmission costs are often higher for renewables.

      Policies to remove these barriers include:

      - Standard interconnection policies
      - Procurement policies (e.g., state power purchases, loading order requirements, long-term contracting with clean DG, etc.)
      - Environmental disclosure
      - Etc.

   b. Policy Design Parameters:

      i. Implementation level(s) beyond BAU:

The call for this volunteer group was under-attended, so this policy option needs to be addressed by the full TWG.

Implementing the various policies above would lead to a ___% increase in renewables and clean distributed generation.

ii. Timing of implementation:

Depends on specific policy to remove barriers.

iii. Implementing parties:

Depends on specific policy to remove barriers.

iv. Other

c. Implementation Mechanism(s): Indicate which mechanisms are to be used, and describe the specific approach that is proposed

i. Information and education

ii. Technical assistance

iii. Codes and standards

iv. Other?

2. BAU Policies/Programs, if applicable:

a.

b.

3. Types(s) of GHG Benefit(s):

a. CO2: By removing barriers to renewables and clean DG, more clean generation can come into the energy supply mix and displace fossil fuels, thereby reducing CO2 emissions.

b. CH4

c. N2O

d. HFC's, SFC's

e. Black Carbon: To the extent that removing barriers to renewables and clean DG lead to displacement of generation from coal and oil, black carbon emissions will decrease.

4. Types of Ancillary Benefits and or Costs, if applicable:

a. Renewables and clean DG typically keep energy dollars in-state, contributing to employment, fuel diversity and security, and price stability for the state.

b.

c.

5. Estimated GHG Savings and Costs Per MMTCO2e:
    a. Summary Table of:
        i. GHG potential in 2010, 2020
        ii. Net Cost per MMTCO2e in 2010, 2020
    b. Insert Excel Worksheet showing summary GHG reduction potential and net cost

6. Data Sources, Methods and Assumptions:
    a. Data Sources
    b. Quantification Methods
    c. Key Assumptions

7. Key Uncertainties if applicable:
    a. Benefits
    b. Costs

8. Description of Ancillary Benefits and Costs, if applicable:
    a. Description of issue #1
    b. Description of issue #2
    c. Etc.

9. Description of Feasibility Issues, if applicable:
    a. Description of issue #1
    b. Description of issue #2

10. Status of Group Approval:
    a. Pending
    b. Completed

11. Level of Group Support:
    a. Unanimous Consent

b. Supermajority

c. Majority

d. Minority

12. Barriers to consensus, if applicable (less than unanimous consent):

a. Description of barrier #1

b. Description of barrier #2

c. Etc.

ES-10: Metering Strategies (2G)

1. Policy Description:

   a. Lay description of proposed policy action:

      There are two common metering strategies and policies, net metering and advanced metering. Net metering is a policy that allows owners of grid-connected distributed generation (generating units on an electricity customer's side of the meter) to generate excess electricity, and sell it back to the grid, effectively turning the customer's meter backward. This policy allows for low transaction costs (no need to negotiate contracts for the sale of electricity back to the utility) and is attractive to DG owners because they are compensated equal to their full cost of purchased electricity (wholesale generation, transmission and distribution, and utility administration costs) – rather than a utility's avoided costs.

      Advanced metering is a technology that allows electricity consumers much greater opportunity to manage their electricity consumption. For example, consumers could set their meter to turn off or turn down air conditioning during the day while they are away. Advanced metering, coupled with pricing strategies that match prices to reflect actual costs during peak times, could be set to automatically adjust demand by turning off lighting or appliances when the price reaches a threshold set by the consumer. A policy can be put into place to encourage the use of advanced metering by subsidizing the meters or by mandating their installation.

   b. Policy Design Parameters:

      i. Implementation level(s) beyond BAU:

         The call for this volunteer group was under-attended, so this policy option needs to be addressed by the full TWG.

         Net metering: All distributed renewables are eligible for net metering. All combined heat and power technologies are eligible. Fossil DG units not in combined heat and power mode must have emission rates better than ___ tons CO2 per kWh and be smaller than ___ MW to be eligible.

         Advanced metering: Arizona implements a policy that pays for ___% of the installed cost of advanced meters and requires that utilities pay for ___% and install them for all customers who request them.

         The TWG needs to make an assumption about how much new distributed generation, and what types, would be installed as a result of net metering. The TWG also needs to make an assumption about the reduction in electricity consumption resulting from advanced meters.

ii. Timing of implementation:

Program starts in 20__.

iii. Implementing parties:

Utilities and utility customers.

iv. Other

c. Implementation Mechanism(s): Indicate which mechanisms are to be used, and describe the specific approach that is proposed

i. Information and education

ii. Technical assistance

iii. Funding mechanisms and or incentives

iv. Market-based mechanisms

2. BAU Policies/Programs, if applicable:

a.

b.

3. Types(s) of GHG Benefit(s):

a. CO2: By encouraging more clean distributed generation through net metering and lower demand through advanced metering there will be less demand for CO2 intensive central generation, leading to reductions in CO2 emissions.

b. CH4

c. N2O

d. HFC's, SFC's

e. Black Carbon: To the extent that clean DG and reduced demand lead to less generation from coal and oil, black carbon emissions will decrease.

4. Types of Ancillary Benefits and or Costs, if applicable:

a.

b.

5. Estimated GHG Savings and Costs Per MMTCO2e:
    a. Summary Table of:
        i. GHG potential in 2010, 2020
        ii. Net Cost per MMTCO$_2$e in 2010, 2020
    b. [Insert Excel Worksheet showing summary GHG reduction potential and net cost]

6. Data Sources, Methods and Assumptions:
    c. Data Sources
    d. Quantification Methods
    e. Key Assumptions

7. Key Uncertainties if applicable:
    a. Benefits
    b. Costs

8. Description of Ancillary Benefits and Costs, if applicable:
    a. Description of issue #1
    b. Description of issue #2

9. Description of Feasibility Issues, if applicable:
    a. Description of issue #1
    b. Description of issue #2

10. Status of Group Approval:
    a. Pending
    b. Completed

11. Level of Group Support:
    a. Unanimous Consent
    b. Supermajority
    c. Majority
    d. Minority

12. Barriers to consensus, if applicable (less than unanimous consent):
    a. Description of barrier #1
    b. Description of barrier #2
    c. Etc.

ES-11: Pricing Strategies (3G)

1. Policy Description:

   a. Lay description of proposed policy action:

      Pricing strategies can take many forms. One strategy is to introduce real-time pricing in which utility customer rates are not fixed, but reflect the varying costs that utilities themselves pay for power. Customers would pay the actual cost of generation (wholesale cost of generation, which varies hourly, plus transmission, distribution and administrative costs) at the time they use the power. For example, under current utility rate structures (simplified here), if the average cost of generation over the year is \$40/MWh, then customers pay \$40/MWh for the generation portion of their bill no matter when they consume electricity. The cost of electricity varies considerably by time of day and season. During summer peak demand periods costs can be as much as \$150/MWh, or more with severe supply constraints. Costs at night in the Spring or Fall can be as low as \$20/MWh.

      With advanced real-time meters, customers would both see and be required to pay for actual costs of generation when they consume it. As a result, they would likely alter their consumption patterns to avoid the highest cost hours of generation. Real-time pricing would also likely result in a shift of demand from peak to off-peak hours. Whether absolute demand would remain level, or some demand reduction would occur, is not clear. To the extent that demand would shift, CO_2 reduction is also not clear. The most expensive peaking resources – old oil and gas turbines and diesel generators – tend to be inefficient and have high CO_2 emission rates. Shifting away from them may lead to CO_2 reductions. However, some of the least expensive generation – coal – also has high CO_2 emission rates. Shifting generation from peakers to baseload coal may not lead to a CO_2 reduction.

      A simpler pricing strategy similar to real-time pricing is "time-of-use" rates, which are fixed rates for different times of the day and/or for different seasons. Customers do not see actual real-time costs, but they do see higher prices during peak times and lower prices during off-peak times. This pricing strategy encourages a similar response by consumers as real-time pricing, but it does not require the use of advanced meters.

      Another pricing strategy is "increasing block" rates. Typically, for some customers, utility rates are defined by blocks of consumption. Typically, the first block of kilowatt-hours is set at one price, and the next block of kilowatt-hours consumed is set at a lower price. This pricing structure encourages more consumption. An increasing block rate would mean *higher* rates as customers consume more blocks, providing an incentive to consume less.

Green pricing is another strategy. Customers are given the opportunity to purchase electricity with a renewable or cleaner mix than the standard supply mix offered by the utility. Green electricity costs more than standard, and that price difference covers the additional cost of cleaner generation. Policies can be put in place that require utilities to offer green power. Policies can also be established to offer green power on a statewide level apart from utility-specific offerings.

b. Policy Design Parameters:

i. Implementation level(s) beyond BAU:

The call for this volunteer group was under-attended, so this policy option needs to be addressed by the full TWG.

Implementation of one or more of the above policies would result in the shift of ___ MWhs of on-peak demand to off-peak demand. These policies would also result in a decrease of ___% in overall demand.

ii. Timing of implementation:

Depends on the particular policies.

iii. Implementing parties:

Utilities and utility customers.

iv. Other

c. Implementation Mechanism(s): Indicate which mechanisms are to be used, and describe the specific approach that is proposed

i. Market-based mechanisms

2. <u>BAU Policies/Programs, if applicable:</u>

a.

b.

3. <u>Types(s) of GHG Benefit(s):</u>

a. CO2:

b. CH4

c. N2O

d. HFC’s, SFC’s

e. Black Carbon

4. Types of Ancillary Benefits and or Costs, if applicable:
    a.
    b.

5. Estimated GHG Savings and Costs Per MMTCO2e:
    a. Summary Table of:
        i. GHG potential in 2010, 2020
        ii. Net Cost per $MMTCO_2e$ in 2010, 2020
    b. Insert Excel Worksheet showing summary GHG reduction potential and net cost

6. Data Sources, Methods and Assumptions:
    a. Data Sources
    b. Quantification Methods
    c. Key Assumptions

7. Key Uncertainties if applicable:
    a. Benefits
    b. Costs

8. Description of Ancillary Benefits and Costs, if applicable:
    a. Description of issue #1
    b. Description of issue #2
    c. Etc.

9. Description of Feasibility Issues, if applicable:
    a. Description of issue #1
    b. Description of issue #2
    c. Etc.

10. Status of Group Approval:
    a. Pending

b. Completed

11. Level of Group Support:
    a. Unanimous Consent
    b. Supermajority
    c. Majority
    d. Minority

12. Barriers to consensus, if applicable (less than unanimous consent):
    a. Description of barrier #1
    b. Description of barrier #2
    c. Etc.

ES-12: Integrated Resource Planning (4G)

1. Policy Description:

   a. Lay description of proposed policy action:

      Integrated Resource Planning (IRP) is a process that diverges from traditional utility least-cost planning. Rather than simply focusing on supply-side options to meet a forecasted growth in emissions, IRP integrates technology and policy options on the demand side with supply side options to satisfy the anticipated demand for energy services. Demand-side measures include energy efficiency, distributed generation, and peak-shaving measures. IRP typically also takes into account a broader array of costs, including environmental and social costs.

      An IRP policy would mandate that utilities develop an Integrated Resource Plan using an approved methodology and implement it. With electricity deregulation in Arizona, it may not be feasible to mandate IRP planning.

      Note: Quantifying CO_2 reductions under a policy mandating IRP would require, in effect, conducting integrated resource planning for all utilities in the state, which is well beyond the scope of this stakeholder process. Results of a cap and trade policy combined with extensive energy efficiency investments may approximate the results of such a policy.

   b. Policy Design Parameters:

      i. Implementation level(s) beyond BAU:

         The call for this volunteer group was under-attended, so this policy option needs to be addressed by the full TWG.

         IRP is an involved process that, by its nature as a bottom-up planning methodology at the utility level, does not lend itself to setting implementation levels per se. The value given to emissions for use in the planning process can be specified, however. In the context of a climate-driven Arizona IRP, a "shadow price" of $___ per ton will be assigned to CO_2 emissions. In making decisions about which resources to use to satisfy demand for energy services, utilities would be required to apply this $___/ton of CO_2 adder in their evaluation of technologies and approaches; utilities would not actually be required to pay $___/ton.

         The TWG needs to decide whether an analysis based on applying a shadow price of __$/ton CO_2 would approximate the results of an IRP process. The TWG may also consider assuming a certain level of energy efficiency is implemented as a result of IRP.

ii. Timing of implementation:

IRP would be required beginning in 20__.

iii. Implementing parties:

Utilities.

iv. Other

c. Implementation Mechanism(s): Indicate which mechanisms are to be used, and describe the specific approach that is proposed

i. Codes and standards

ii. Other?

2. BAU Policies/Programs, if applicable:

a. No mandated IRP process is in place in Arizona.

b.

3. Types(s) of GHG Benefit(s):

a. CO2: IRP is a planning process that attempts to factor in the external cost of emissions, including CO2. Lower emitting technologies are favored as a result. It also treats demand-side efficiency options as equal to supply-side options in the planning process, so fewer or smaller fossil fuel plants may be needed. The end result is potentially significant CO2 savings.

b. CH4

c. N2O

d. HFC's, SFC's

e. Black Carbon: To the extent that generation from coal and oil is reduced under IRP, black carbon emissions will also be reduced.

4. Types of Ancillary Benefits and or Costs, if applicable:

a. IRP attempts to take into account social costs including the impact on the economy as well as health impacts and costs related to criteria air pollution.

b.

5. Estimated GHG Savings and Costs Per MMTCO2e:

a. Summary Table of:

iii. GHG potential in 2010, 2020

iv. Net Cost per $MMTCO_2e$ in 2010, 2020

b. [Insert Excel Worksheet showing summary GHG reduction potential and net cost]

6. <u>Data Sources, Methods and Assumptions:</u>
   a. Data Sources
   b. Quantification Methods
   c. Key Assumptions

7. <u>Key Uncertainties if applicable:</u>
   a. Benefits
   b. Costs

8. <u>Description of Ancillary Benefits and Costs, if applicable:</u>
   a. Description of issue #1
   b. Description of issue #2
   c. Etc.

9. <u>Description of Feasibility Issues, if applicable:</u>
   a. Description of issue #1
   b. Description of issue #2
   c. Etc.

10. <u>Status of Group Approval:</u>
    a. Pending
    b. Completed

11. <u>Level of Group Support:</u>
    a. Unanimous Consent
    b. Supermajority
    c. Majority
    d. Minority

12. Barriers to consensus, if applicable (less than unanimous consent):
    a. Description of barrier #1
    b. Description of barrier #2
    c. Etc.